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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/774,113	02/06/2004	Scott C. Blanchet	B429-064	8369

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EXAMINER

TSANG FOSTER, SUSY N

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 12/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/774,113

Applicant(s)

BLANCHET ET AL.

Examiner

Susy N Tsang-Foster

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 5/14/2004 & 2/6/2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 20040506
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement filed on 5/6/2004 has been considered by the Examiner.

Claim Objections

2. Claim 1 is objected to because of the following informalities: In claim 1, line 3, “forming” should be “reforming”. Appropriate correction is required.

Specification

3. The disclosure is objected to because of the following informalities:

On page 12, the paragraph beginning at line 11 does not appear to make sense when read in light of Figure 2. In Figure 2, the first portion of the fuel 111 A is fed into the heater that is then fed into the indirect internal reforming passage so it is unclear what is meant by the fresh supply fuel 111A being at a cooler temperature than the fuel cell assembly temperature when it is combined with the stream from the indirect internal reforming passage 106.

Appropriate correction is required.

Claims Interpretation

4. In claim 1, the limitations after the phrase “adapted to” are given patentable weight. The phrase “adapted to” is interpreted by the Examiner not to be synonymous with “optional or

suggested”. The phrase “adapted to” may raise a question as to the limiting effect of the language of a claim. See MPEP 2106.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1 and 2 are rejected under 35 U.S.C. 102(b) as being anticipated by Baker et al. (US Patent No. 4,182,795).

Baker et al. disclose a fuel cell system comprising a fuel cell assembly having one or more fuel cells that include direct internal reforming passages 18a and indirect internal reforming passages 22a for reforming a fuel supply 38 (see Figures 1, 2, and 4 and col. 3, lines 28-51; col. 4, lines 23-63). Baker et al. disclose that passages 22a and passages 18a are commonly connected therewith by input anode gas manifold 26 (col. 4, lines 34-40). However, Baker et al. also disclose that desired flows in passages 22a may include the placement of variably-settable constrictions in flow passages 22a. The manifold 26 and the variably-settable constrictions read on a coupling assembly for selectively and adjustably controlling the coupling of first and second fuel supply portions to the respective one or more indirect internally reforming passages and one or more direct internally reforming passages (col. 5, lines 45-57 and abstract).

Since the output gas from the anode exhaust which at a high temperature from the fuel cell reaction is recycled to fuel supply 36, the remaining heat content in the anode output gas functions as a heater to heat the supply gas 36 (col. 5, lines 8-23 and Figure 2).

7. Claims 1, 4, and 5 are rejected under 35 U.S.C. 102(b) as being anticipated by Matsumura et al. (US Patent No. 4,647,516).

Matsumura et al. disclose a fuel cell system comprising a fuel cell assembly having a plurality of cells and includes direct internal reforming passages on separator plate 6 and indirect internal reforming passages for reforming a fuel supply on cooling plate 11 (see Figures 2 and 3, abstract, col. 3, lines 60-68; col. 4, lines 1-47). The whole amount of fuel gas externally supplied is fed into the first indirect reforming region and the fuel gas reformed in the first indirect reforming region is fed into the second direct reforming region (col. 5, lines 12-16). In another embodiment, the fuel gas externally supplied is divided into two parts, one of which is fed into the first reforming region 11 and is reformed and the remainder of the fuel gas externally supplied and the part of the fuel gas reformed in the first reforming region are joined and then fed into the second reforming region 6 and such a structure involves somewhat complicated piping but it is desirable to control the amount of decomposition of hydrocarbon or alcohols in the first indirect reforming region (col. 5, lines 17-36).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsumura et al. (US Patent No. 4,647,516) in view of Farooque (US Patent No. 4,917,971).

Matsumura et al. disclose all the limitations of claims 2 and 3 (see above) except disclosing heating the fuel supply portion being coupled to the indirect internal reforming passages after or before dividing the fuel supply into first and second portions respectively supplied to the indirect and direct reforming regions in the fuel cell assembly.

Farooque (US Patent No. 4,917,971) teaches using cathode exhaust stream 61A to heat the fuel supply prior to introduction to the anode compartment for internal reforming (see col. 5, lines 30-45 and Figure 5).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to heat the fuel supply of Matsumura with cathode exhaust gas prior to introduction to internal reforming passages of the fuel cell assembly because it is efficient to use the cathode exhaust gas to provide the heat necessary for the endothermic reaction of the fuel gas during internal reforming and to prevent a sharp temperature gradient between the fuel gas and operating temperature of the fuel cell which would lower the efficiency of the fuel cell.

It would have also been obvious to one of ordinary skill in the art at the time the invention was made to heat the gas before or after dividing the fuel stream into first and second portions because the courts have held that the selection of any order of performing process steps

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is prima facie obvious in the absence of new or unexpected results, In re Burhans, 154 F.2d 690, 69 USPQ 330 (CCPA 1946).

10. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Matsumura et al. (US Patent No. 4,647,516) in view of Hsu (US Patent No. 6,458,477 B1)

Matsumura et al. disclose all the limitations of claim 6 (see above) except disclosing valves in a first conduit for adjusting the first fuel supply portion and a second valve in the second conduit for adjusting the second fuel supply portion. As discussed above, Matsumura et al. disclose that the fuel gas externally supplied is divided into two parts, one of which is fed into the first reforming region 11 and is reformed and the remainder of the fuel gas externally supplied and the part of the fuel gas reformed in the first reforming region are joined and then fed into the second reforming region 6 and such a structure involves somewhat complicated piping but it is desirable to control the amount of decomposition of hydrocarbon or alcohols in the first indirect reforming region (col. 5, lines 17-36).

Hsu (US Patent No. 6,458,477 B1) teaches that those of ordinary skill will readily recognize that passive or active control systems, such as valves, can be employed to control the amount of fuel or air introduced to the fuel cell stack (col. 10, lines 65-67 and col. 11, lines 1-5).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use valves in the first and second conduits providing respective first and second portions of the fuel supply in order to control the amount of fuel to the respective direct and indirect reforming passages of the fuel cell assembly of Matsumura et al.

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11. Claims 7 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsumura et al. (US Patent No. 4,647,516) in view of Hsu (US Patent No. 6,458,477 B1) as applied to claim 6 above, and further in view of Farooque (US Patent No. 4,917,971).

Matsumura et al. in combination with Hsu disclose all the limitations of claims 7 and 9 (see above) except disclosing heating the fuel supply portion being coupled to the indirect internal reforming passages after or before dividing the fuel supply into first and second portions respectively supplied to the indirect and direct reforming regions in the fuel cell assembly.

Farooque (US Patent No. 4,917,971) teaches using cathode exhaust stream 61A to heat the fuel supply prior to introduction to the anode compartment for internal reforming (see col. 5, lines 30-45 and Figure 5).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to heat the fuel supply of Matsumura with cathode exhaust gas prior to introduction to internal reforming passages of the fuel cell assembly because it is efficient to use the cathode exhaust gas to provide the heat necessary for the endothermic reaction of the fuel gas during internal reforming and to prevent a sharp temperature gradient between the fuel gas and operating temperature of the fuel cell which would lower the efficiency of the fuel cell.

It would have also been obvious to one of ordinary skill in the art at the time the invention was made to heat the gas before or after dividing the fuel stream into first and second portions because the courts have held that the selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results, In re Burhans, 154 F.2d 690, 69 USPQ 330 (CCPA 1946).

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12. Claims 8 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsumura et al. (US Patent No. 4,647,516) in view of Hsu (US Patent No. 6,458,477 B1) and Farooque (US Patent No. 4,917,971) as applied to claims 7 and 9 above, and further in view of Koga et al. (US Patent No. 5,082,752).

Matsumura et al. in combination with Hsu (US Patent No. 6,458,477 B1) and Farooque (US Patent No. 4,917,971) teach all the limitations of claims 8 and 10 (see above) except the fuel cell system having a mixer for mixing anode exhaust gas from one or more fuel cells with an oxidant supply; and oxidizer for receiving the stream from the mixer and the oxidizer output serving as the cathode inlet gas for the one or more fuel cells.

Koga et al. teach combining (mixing) anode exhaust gas 21 with an oxidant supply 7 (cathode exhaust) and feeding the combination to a combustor 12 (which is an oxidizer) and combining the exhaust 22 of the combustor (oxidizer output) with pressurized air 5 to be fed into the cathode let of the fuel cell (col. 2, lines 42-65 and Figure 10).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine anode exhaust gas with cathode exhaust (an oxidant) and feeding the combination to a combustor and combining the exhaust 22 of the combustor with pressurized air to be fed into the cathode let of the fuel cell in order to heat up air to a suitable temperature depending on the desired air utilization ratio prior to introduction into the fuel cell and provide the necessary carbon dioxide from the oxidizer for the cathode reactions in a molten carbonate fuel cell.

Conclusion

Any inquiry concerning this communication or earlier communications should be directed to examiner Susy Tsang-Foster, Ph.D. whose telephone number is (571) 272-1293. The examiner can normally be reached on Monday through Friday from 9:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at (571) 272-1292.

The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

st/ 

Susy Tsang-Foster
Primary Examiner
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